

Special Issue: New Supply Chain Models: Disruptive Supply Chain Strategies for 2030

Guest Editors: Professor Dr Richard Wilding OBE and Dr Beverly Wagner

### ***Systematic review and the need for evidence***

Systematic reviews of management literature have only become common over the past 15 years and it can be argued that the purpose of such reviews is to aid evidence-based decision making. Roots of the systematic review approach are to be found in medical and health care research where appraising and synthesising evidence presented in multiple studies has been critical in limiting bias. The recognition by Smith in the early 1990's in his publication in the British Medical Journal (Smith, 1991) that 15% of medical interventions are supported by solid scientific evidence provided an interesting insight into the extent of the problem within medicine and the need for evidence based practice. This and similar insights provided the impetus for systematic review to be utilised more fully within medical research.

When presenting such works, evidence is critical and in order to generate it, a robust auditable methodology needs to be applied. If done well, a researcher repeating the study should come to the same conclusions as the original researcher.

This contrasts with many narrative reviews that tell a story from literature. Such weaker reviews take elements from literature that supports the author's thesis and ignore any which are not seen to fit! This can result in biased conclusions not repeatable by other researchers and un-auditable and subjective claims.

Supply Chain Management: An International Journal has pioneered the promotion and publishing of systematic reviews in the area of logistics, procurement and supply chain management. Our first special issues, published in 2012, focused on "Building Theory in Supply Chain Management through systematic reviews of the literature (Volume 17 Numbers 4 and 5 2012). The response from this call was overwhelming and resulted in a Part 1 and Part 2 having to be published to capture the excellent insights from authors. Sister journals have recognised the important contribution that systematic reviews can make and have undertaken similar special issues. For example, the International Journal of Physical Distribution and Logistics Management (Volume 45, Numbers 1 and 2 (2015) & Volume 48 Numbers 3 and 8 (2018). More recently Durach et al 2017, in the Journal of Supply Chain Management proclaim a new paradigm for systematic reviews in supply chain management further highlighting the impact of the approach within the sector.

Our first call for papers in 2012 was launched after experiencing success in applying systematic reviews in a variety of contexts within our Business Schools. Initially research students starting doctoral studies who applied systematic reviews within some of our Universities (e.g. Cranfield School of Management) found the approach rigorous and empowering. Evidence provided by such techniques clearly identified

“gaps in the body of knowledge” and enabled students to quickly and effectively focus on their desired dissertation topic. Systematic review dissertations were also submitted as a part requirement for Master of Research (MRes) degrees leading to doctoral research. On taught Masters Programmes, a modified systematic approach was also applied by students undertaking research based thesis within the University. This approach allowed students to rigorously review literature in a “scientific” way and methodological steps in the systematic review methodology proved useful by enabling most students to “hit the ground running.” The rigour required by systematic reviews also increased the number of MSc thesis research projects developed into refereed academic papers. Due to the success of this approach the authors were invited to promote the approach globally to research students and academics. The approach is now utilised readily for teaching and learning at Masters and Doctorial level enabling learner’s to progress in a structured way but still supporting creativity in interpretation of insights.

The value of systematic reviews in supply chain management has also been recognised by commercial organisations. As part of research interventions, it was found that companies were willing to “pay” for systematic reviews enabling a strong evidence based foundation for commercial leadership.

#### ***What makes a good systematic review?***

An important question often asked is “what makes a good systematic review?” As will be seen from papers presented in these issues, key components need to ensure that work is evidence based and robust. A variety of different approaches can be applied and papers presented in these special issues have aimed to all follow a systematic and auditable methodology.

When introducing the review context and assessing its quality it is useful to ask the following:-

- “Has the researcher identified an appropriate focus and scope?”

This is particularly important, as firstly a systematic review requires focusing on a specific, tightly defined area. Before the review can be undertaken, the researcher will often need to produce a more traditional review to identify the specific area to focus on in detail.

When the methodology for the review is being implemented, further questions need to be asked including

- Is the review transparent, repeatable & auditable? Have the procedures for searching, selecting, appraisal, data extracting and synthesising been made explicit and are they logical and defensible? Have journal and publication quality criteria been identified and applied? Has material excluded and included in the review been fully justified? Are the inclusion and exclusion criteria clear and defensible? Does the reviewer clearly demonstrate what is, and what is not, in the field of study?

For sound results and analysis, the following additional questions need to address the descriptive and theoretical analysis elements of the review.

- Does the reviewer provide a comprehensive field map by using a balanced set of characteristics? Has the reviewer provided a descriptive analysis (for example, geographical, analytical, sector, chronological, etc.) within the body of literature? Is the review complete with no obvious omissions (key authors, concepts, references, journals commonly utilised etc)?
- Has the reviewer identified and demonstrated an understanding of the main theoretical and methodological debates in the field? Has the reviewer provided a thematic and relational analysis of the body of literature? Does the review make identify potential research gaps and make recommendations for future investigation?

The basic approach and method of systematic review has remained relatively unchanged however the tools and techniques utilised to provide a systematic and auditable insights from the literature are evolving rapidly. The effective use of what could be termed “Big Data Analytics” to mine literature and identify connections has evolved in the past couple of years. For example, Leximancer software (Leximancer 2018) which analyses text documents to identify high level concepts and visualise these is proving invaluable for some investigations. Bibliometric analysis using citation network analysis is also providing useful as part of the systematic review process, influential publications can be readily identified, clusters and networks around journals, researchers and individual publications. (for example VOSviewer 2018, CitNetExplorer 2018). Such tools and approaches can provide novel maps of the subject field and support the identification of common themes and concepts. We anticipate such approaches to be utilised more fully in coming years in systematic reviews of the literature.

We have been overwhelmed by the response to our call and received a significant number of high quality papers. It is hoped this special issue will become a further benchmark for systematic reviews in the area of supply chain management and will encourage others to undertake such work by further developing theory in the subject area.

The aim of this special issue was to consider breakthrough and emerging technologies that may influence supply chain management in your industrial sector or business. There is a gap between these emerging technologies and their use and we wish to explore this and their potential to reshape industry and ecosystem. A particular challenge for authors contributing has been the “lag” within the academic literature, it can be argued that in such a fast developing area of breakthrough and emerging technologies the debate in practitioner literature is at times more relevant and current, with the academic literature following. To capture important practitioner literature researchers need to modify inclusion and exclusion criteria while maintaining rigour and auditability. It is hoped that this special issue forms the foundations for empirical research in the impact of disruptive technologies in supply chain management and encourage others to develop theory and practical insights in the area.

### ***Overview of Special Issue, Part 1***

Nine articles are summarised as follows:-

Article 1: Information Sharing in Supply Chains: A Review of Risks and Opportunities using the Systematic Literature Network Analysis.

This submission explores risks and threats related to emerging technologies and impact on information sharing in the supply chain. Current literature focuses on internal hazards related to information sharing with limited consideration to risks associated with external threats that include intentional and non-intentional information leaks, such as virus attacks. The literature review, reveals four clusters, where the emergence of Industry 4.0 present risks, opportunities and implications for supply chain management (1) Protection of supply chain from internal threats (2) Asymmetric information in the supply chain (3) Technology for data sharing and e-commerce, and (4) Information for improved supply chain resilience. Complex supply chains are vulnerable to leakage of information and the literature review considers how firms mitigate risk and build resilience. Implications for information sharing and managing risks associated with emerging technologies is encapsulated in key constructs related to trust building, interpersonal relationships, collaboration and cooperation mechanisms, government support and institutional and contractual environment.

Article 2: The Self-Thinking Supply Chain.

The self-thinking supply chain is related to the adoption of autonomous and predictive capability developments in Information Communication Technologies (ICT). The results of the systematic literature review show that the Internet of Things (IoT) and Artificial Intelligence (AI) are the digital technologies most often associated with a Fourth Industrial Revolution. Automated collection and analysis of massive amounts of data within supply chains enables real time decision making, reducing operating costs. The predictive capability supports demand management, minimising the bull-whip effect and reducing failures that lead to supply chain disruption. RFID has been applied in supply chain management for many years and is the basis of IoT, which reduces the need for human intervention through machine-enabled decisions. Suggested research streams are related to (1) quantifying benefits of technology adoption (2) designing self-thinking architecture in different contexts (3) investigating risks of cyber threats (4) exploring managerial and policy perspectives of the self-thinking supply chain.

Article 3: Impact of IoT Challenges and Risks to SCM

IoT is defined as a network of physical objects which are digitally connected to sense, monitor and interact with a company and its supply chain. The focus of research has been on the potential value and applications, with limited studies on the negative effects. Within this review, challenges to adoption have been identified as economic (high costs, business model adaptation and unknown business benefits or return on investment); social (privacy concerns, trust issues, impact on human lives and unknown

effects on society); technical (security, lack of standards and interoperability, insecure web interfaces, authorisation); political (lack of legal regulations, security regulations, data usage between organisations, opportunism); network related (trust, implementation, strong collaboration, intensive data exchange, power balance and asymmetrical information and organisational (operational, financial and human resources). To overcome these, academics and practitioners need to look beyond traditional business models, build value through cooperation, build trust and mitigate fears over privacy. Future research should consider how information is delineated between organisations and the impact of trust building and information security within collaboration arrangements.

Article 4: Understanding blockchain technology for future supply chains: a systematic literature review and research agenda.

Blockchain technology uses shared data infrastructures that update in real time, process transactions in minutes and allow for the secure exchange of data in a distributed manner. The systematic literature review posed four research questions (1) to identify drivers to blockchain deployment in supply chains. The main drivers for seamless connectivity are trust, ethics and social responsibility supporting growing consumer awareness of product authenticity, provenance and sourcing legitimacy. The review highlighted the dark side of cryptocurrencies including, limited governance systems, regulation and privacy concerns. (2) To identify areas where blockchain provides the most value for supply chain management. The importance of traceability and visibility are key to large scale deployment of blockchain, leaving a digital footprint from manufacturer to end user. (3) To explore the challenges and barriers to diffusion within the supply chain. The need to nurture network relationships and develop shared values is highlighted. Unwillingness to share information and associations with criminal activity are key barriers, as well as consumer privacy and environmental concerns related to energy consumption. (4) To develop a future research agenda. This review provides insights into the value of blockchain technologies in four supply chain areas; extended visibility and traceability; supply chain digitalisation and disintermediation; improved data security and smart contracts.

Article 5: Traceability for Sustainability- Literature Review and Conceptual Framework.

This paper explores how companies embed traceability in their global supply chains by adopting advanced technologies such as IoT, RFID and Blockchain. A conceptual framework is derived from the systematic literature review, comprising three main dimensions, governance, collaboration and tracking and tracing. Governance is made up of formal (regulation, compliance mechanisms, codes of conduct and industry standards) and informal mechanisms (trust and relational control). Collaboration is the backbone of supply chain management and linked to communication and information sharing. Tracking and tracing is related to organisational practices and processes involved in real time tracing and monitoring of products throughout the supply chain. Visibility and transparency, enabled by technological tools and management systems, are preconditions for effective

tracking and tracing. Findings demonstrate that the technologies can only operate when the supply chain is connected in a single ecosystem and support the notion of a circular economy. Enabling technologies open the door to new possibilities to apply traceable systems, facilitate the development of capabilities and foster strategic collaboration.

#### Article 6: Swarm Intelligence Approaches in Supply Chain Management: Potentials, Challenges and Future Research Directions.

Swarm intelligence is based upon swarm based algorithms, which have been used extensively in supply chain network design. This article presents generic formulations for optimization problems in distribution network design, vehicle routing, resource allocation, inventory management and supplier management. One of the challenges for SCM is that all the actors in the supply chain work under different contexts, with different objectives and constraints. In the literature, Swarm Intelligence focuses on improving problems and one of the traits of Swarm Intelligence is capturing the self-organising nature of swarms. The authors suggest that it is imperative that managers have a basic understanding of underlying Swarm Intelligence algorithms before implementing smart technology software. This paper presents some guidelines for implementation.

#### Article 7: Smart Industry and the Pathways for HRM 4.0: Implications for SCM.

This paper addresses the potential impact of Industry 4.0 on human resource management. The results highlight four key themes, educational changes, employment scenarios, work infrastructure resources and work meaning. Due to the introduction of technologies and automation, old working activities are disappearing and being replaced with entirely new ones, which may create tensions between humans and machines. As the work environment and required skills sets change, organisations will have to align their HRM strategies and practices with Industry 4.0 in order to address workforce employment and skills development. The application of digital technologies will alter business models, change work patterns and create new employment opportunities. This has far reaching implications, for education and training, as it may lead to redundancies as labour is replaced by machines. This contribution states that the fourth industrial revolution presents risk (inevitable job losses), opportunities (more efficient production systems) and challenges (introduction of new business models and new education systems) as technology and knowledge management revolutionise operations in organisations and across supply chains.

#### Article 8: Facing Disruptive Technologies: Aligning Purchasing Maturity to Contingencies.

Disruptive technologies are expected to change every aspect of purchasing, including managing the supply base, supply risk and supplier relationships. This submission explores how purchasing maturity and purchasing alignment are suitable approaches to respond to disruptive technologies. Each approach is not helpful on its own and the study suggests that purchasing must employ a new approach to respond



to disruptive technologies. Purchasing maturity means applying best practice to help purchasing respond to changes in the environment. Purchasing strategic alignment means linking purchasing practices to the firm's strategy and provides a method to select the most suitable practices for responding to disruptive technologies. The authors suggest that these two research streams are usually not linked in academic literature and a contingency perspective is required, whereby purchasing maturity models is contingent on purchasing strategy. Thereby ensuring a consistent approach to dealing with technological disruptions.

Article 9: A look into the Past and Future: Theories within Supply Chain Management, Marketing and Management.

This submission sets out to identify the most frequently used theories utilised in supply chain management research. Thirty theories are briefly outlined that may be appropriate to investigate the implementation and use of disruptive technologies in the supply chain. The broad brush approach aims to support the theoretical development within supply chain management by drawing upon supply chain management, marketing and management literature. The results show that supply chain researchers usually rely on a small number of theories and the Resource-Based View and Transaction Cost Economics are the most prevalent theories used to provide theoretical insights. This comprehensive list of thirty theories may offer alternatives for supply chain scholars to apply novel theoretical lens to the subject area.

### Summary

The systematic reviews in this special edition make a foundational contribution to research into disruptive supply chain strategies. It is recognised that as is the case in many emerging technologies and strategies some will fall away as research and debates continue to develop. However we do hope that the papers in this special edition will enthuse academics and practitioners to ask questions and innovate, benefiting society, the environment and the global economy.

### References

Durach, Christian F; Kembro, Joakim; Wieland, Andreas, (2017), A new paradigm for systematic literature reviews in supply chain management *Journal of Supply Chain Management*; Wheat Ridge Vol. 53, Iss. 4, 67-85.

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As Chair (Full Professor) in Supply Chain Strategy at the Centre for Logistics and Supply Chain Management, Cranfield School of Management U.K. Richard works with European and International companies on logistics and supply chain projects in all sectors including pharmaceutical, retail, automotive, high technology, food drink and professional services to name a few. He is currently Chairman of the Chartered Institute of Logistics & Transport U.K. representing professionals involved in the movement of goods and people and their associated supply chains. He is a champion for encouraging evidence based decision making within industry and is an advocate for ensuring academic knowledge can create action and impact within the organisations he works with. Richard was appointed an Officer of the Most Excellent Order of the British Empire (OBE) by Queen Elizabeth II in the 2013 New Year Honours for services to Business. In 2017 he was awarded both the Talent in Logistics Award for his life time contribution to learning and training in Logistics and was awarded the 2017 Logistics 100 Award, thus identifying him as the U.K.'s top logistics professional of the year. Richard's special areas of interest include the creation of collaborative business environments, reducing supply chain vulnerability & risk, time compression and techniques for aligning supply chains to maximise customer value and reduce cost.

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Dr. Beverly Wagner is editor of Supply Chain Management: An International Journal. Her interests lie in the area of buyer / supplier relations which includes inter-organisational cooperation, supply chain management, network organisations and innovation in SMEs. Beverly has been involved in research into formation and implementation of partnering and business alliances in the drinks and packaging sector, also in the microelectronics and oil and gas industries. Over time, the focus of her research has changed from investigating supplier and retailers relations, to the use of social network techniques so as to understand complex inter-organisation relationships. Current areas of interest are to better understand how companies implement and sustainable business models, innovation management processes, open innovation implementation and value creation in buyer/supplier relationships.

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